

tion from New Zealand has, I think, been small. Probably no land existed in the Antarctic Pacific to convey plants and animals from New Zealand to South America, and a northern migration of New-Zealand plants is almost out of the question. A few stragglers may have been carried by birds to Tasmania or to temperate Australia, but that perhaps is all that can be allowed. Our fauna and flora is indeed a standing protest against the views of those naturalists who would make the winds scatter abroad insects and seeds of plants over hundreds of miles, and who imagine land-shells and lizards to float about on logs for days and weeks together without being killed.

#### NOTES TO PART I.

1. Mr. Etheridge, as mentioned in the text, was the first to suggest that the Desert Sandstone of Australia was a lacustrine deposit; but it was a mere suggestion. Prof. Ralph Tate arrived at the same conclusion quite independently, and brought forward facts to support it. (See Anniversary Address, Roy. Soc. of South Australia, for 1878-79, p. lx.)

2. At the meeting of the Linnean Society of New South Wales, held on 30th July, 1884, Mr. Ratte exhibited fossils of the genera *Rostellaria*, *Fusus*, *Pleurotomaria* (?), *Belemnites*, *Venus*, and *Nautilus*, from the interior of New Caledonia, together with a fragment of bone. He observed that these fossils were characteristic of the Upper Cretaceous period, and were likely to identify these New-Caledonia beds with some already known in New Zealand. He also exhibited an *Inoceramus* from the Neocomian of Noumea.

3. Before this Address was delivered, Mr. A. Agassiz had come to the conclusion that the specialization of the Atlantic and Indo-Pacific faunas began soon after the end of the Cretaceous period. (Report on the 'Blake' Echini, part i. p. 83, September 1883.)

4. Since this Address was in type I have come across an article in the 'Geological Magazine' for 1882, by Mr. J. S. Gardner, in which several of the views maintained in my two Addresses are enunciated.

X.—*Descriptions of Sponges from the Neighbourhood of Port Phillip Heads, South Australia.* By H. J. CARTER, F.R.S. &c.

[Plate IV.]

HAVING through the kindness of Mr. J. Bracebridge Wilson, M.A., F.L.S., of the Church of England Grammar School, Geelong, Col. Victoria, received a great number of spirit-preserved and dry specimens of Sponges which have been forwarded simply in the hope that they might afford material for the advancement of our knowledge of this branch of Natural History, I propose in return to carry out his views in this respect to the best of my ability, and thus shall commence with the following descriptions.

Hitherto I have had very few opportunities of examining any but dried specimens from this coast of South Australia, and these, from their worn appearance, have evidently been picked off the beaches there; but now I am in possession of 359 specimens which have been taken direct from their natural habitat, out of which 59 have been dried, and all dredged in the neighbourhood of Port Phillip Heads, at the beginning of 1884; besides which, another consignment has been sent to me by Mr. Wilson which I am expecting every day, that is, as soon as the ship ('Sarah Grice') in which they have been forwarded shall have arrived.

Of the spirit-preserved specimens Mr. Wilson states that the galvanized iron boxes with wide circular apertures and covers (like tea-chests), in which they are contained, having been partly filled with methylated spirit, were thus kept ready in the boat to receive the sponges as they were being brought up by the dredge; but before they were cast into it, each specimen was numbered on vellum, in black-lead pencil, and the number entered in a note-book together with the colour of the sponge at that moment, its locality, and the depth of water in which it was dredged, while copy of this was also sent to me by post, and the sponges not disturbed again until the boxes, subsequently filled up with spirit and hermetically sealed down, came into my possession. Thus it may be assumed that they reached me in very good condition, which is the case. On the other hand, the *dried* specimens, after having been taken on shore, were carefully soaked in fresh water until their sea-salt was entirely extracted, and then dried, so that they, as specimens, are infinitely superior to those picked up on the beaches; still the latter method has its advantages, for in no way can we get the fibrous skeletons, especially of the keratose sponges, so clean and favourable for description as when they have been thoroughly washed out by putrefaction of the sarcode and subsequent exposure to the friction of the waves on the sea-shore.

I will now commence the "descriptions," to which I have above alluded, with

*Esperia parasitica*, n. sp. (Pl. IV. fig. 1, *a-h*.)

Parasitic, growing over the sand-cored or sand-axiated fibre of a dead Psammonematous sponge so as to entirely conceal it under cover of an Esperian structure. Specimen oblong, somewhat compressed, square as if cut off (? by the dredge) at one end, rounded at the other. Consistence elastic, puffy like a hair-stuffed pillow, from the elastic nature of the Psammonematous structure inside. Colour grey. Surface

even; with small elevations and close reticulated tissue. Pores in the interstices of the reticulation. Vents large, disposed in line, along the round end. Internally cavernous, from the parenchyma of the *Esperia* being chiefly confined to the sand-cored fibre of the old Psammonematous structure. Spicules of four forms, viz. :—1, skeletal, acute, smooth, slightly curved, head oval, elongated, *Esperia*-like, constricted, passing on to a fusiform shaft which is wider than the head, ending in an obtuse point, 78 by  $1\frac{1}{2}$ -6000ths in. in its greatest dimensions (fig. 1, *a*); 2, inequianchorate, in which the free end is small and composed of *four* teeth that tend towards horizontal rather than vertical extension, shaft long and much curved, fixed end, which is also small, quadrilateral in appearance, total length 11-6000ths in. (fig. 1, *b, f, g, h*); 3, biharmate, simple, the only one seen (in the preparation) and that broken off at one end, which has been supplied in the representation (fig. 1, *c*); 4, minute inequianchorate with elongated, spine-like process prolonged from the small end, about 4-6000ths in. long (fig. 1, *d*). No. 1 is plentifully distributed throughout the tissue with Nos. 2 and 4; the former, that is the large inequianchorate, chiefly *en groupe* or in the so-called "rosette" form (fig. 1, *e*). Size of specimen about 4 in. high by 5 × 2 in. horizontally in its greatest dimensions.

*Hab.* Marine, growing over the skeletal fibre of a dead Psammonematous sponge.

*Loc.* Port Phillip Heads, South Australia. Depth &c. not given.

*Obs.* This species is chiefly characterized by the free end of the large inequianchorate (No. 2) being furnished with *four* teeth; by "free" here is meant that end which *en groupe*, that is, in the globular rosette-form, is outside (fig. 1, *e*). The presence of the minute inequianchorate with spine-like end (fig. 1, *d*), although not peculiar, is uncommon (see 'Annals,' 1882, vol. ix. pl. xi. fig. 16, *e, f*; erroneously written "equianchorate" at p. 298).

Had not Dr. Bowerbank's inequianchorate from an "undescribed species of *Hymeniacidon* from Freemantle, Australia," which was also "parasitical," been "tridentate" (Mon. Brit. Spong. vol. i. pp. 49 and 249, fig. 135, pl. vi.), I should have identified it with that of *Esperia parasitica* from its great resemblance; at the same time I must at least observe that a *tridentate* form of inequianchorate could never present its teeth in the position given to them in Dr. Bowerbank's figure!

*Forcepia colonensis*, 1874. (Pl. IV. fig. 2, a-e.)

Specimen massive, irregularly circular and truncate (? cut off by the dredge) at the base, rising into several thick, conical processes above. Consistence firm. Colour, when fresh, "brilliant scarlet," now violet-grey. Surface smooth, wrinkled. Pores in the dermis generally. Vents large, scattered over the upper part, one at the end of each conical process. Internally, dermis thick; subdermal cavities large, furnished with circular folds which are continued on to the surface of the excretory canals beneath. Parenchyma dense, traversed by the branches of the excretory canal-systems, which terminate at the vents mentioned. Spicules of two forms, viz.:—1, skeletal, consisting of a cylindrical more or less undulating, smooth shaft, passing into a globular inflation at each end, which is a little wider than the shaft, 101 by  $2\frac{1}{2}$ -6000ths in. in its greatest dimensions (fig. 2, *a*); 2, flesh-spicule, consisting of a cylindrical shaft, bent forceps- or hairpin-like, terminating abruptly in round or pointed extremities, thickly spined throughout, spines all recurved towards the bend, 22 by  $1\frac{1}{2}$ -6000ths in. in its greatest dimensions (fig. 2, *b*). Both forms plentifully present throughout the structure, the latter most abundant on the surface. There are traces also (in my preparation) of minute equianchorates, triradiates, and bihamates (fig. 2, *c*, *d*, *e*), but not sufficiently numerous to be characteristic of, if even part of, the spiculation. Size of specimen  $3\frac{1}{2}$  in. high by 4 to  $4\frac{1}{2}$  in. in diameter at the base.

*Hab.* Marine.

*Loc.* Port Phillip Heads, South Australia. Depth 19 fath.

*Obs.* In 1874 ('Annals,' vol. xiv. p. 248, pl. xv. fig. 47) I described and illustrated the flesh-spicule of this species, which was obtained loosely from dredgings near Colon, Panama, and then provisionally proposed the above name for the sponge to which they might have belonged, and which has now been found to exist also, in the form above described, on the south coast of Australia.

As above stated, there are minute equianchorates, tricurvates, and bihamates present; but although such forms characterize the spiculation in some of the other species of *Forcepia*, their existence here is so insignificant, from their scantiness and smallness, that they have not been enumerated in the spiculation. I have often noticed that in sponges where there are more than one form of flesh-spicule, the development is very unequal; that is, that one appears to be greatly increased in size at the expense of the others, which may be the case in

*Forcepia colonensis*, at least this is exemplified in the next species, viz. *F. crassanchorata*, wherein the *anchorate* is the most prominently developed.

*Forcepia crassanchorata*, n. sp. (Pl. IV. fig. 3, a-g.)

Specimen dry, round, cake-like, compressed, bearing the appearance of a beach-rolled specimen. Consistence now light. Colour fawn. Surface rough, reticulated. Pores not seen (? dried up). Vents scattered here and there. Internal structure like "crumb of bread." Spicules of four forms, viz. :—1, skeletal, acute, often subpinlike, curved, smooth, abruptly sharp-pointed (fig. 3, a); 2, also skeletal, slightly curved, smooth, fusiform, inflated pin-like at *each* end (fig. 3, b), both about the same size, viz. 66 by 2-6000ths in. in their greatest dimensions; 3, forceps-like spicule, very thin, microspined on the body, smooth and finely pointed at the extremities, arms of equal length, 19-6000ths in. long, extremities very close, that is, separated only for about 1-6000 in. (fig. 3, c); 4, equianchorate, very short and very stout, nearly as broad as long, arms ?-petaloid, 6-6000ths in. long by 5-6000ths in. broad (fig. 3, e, f). All the spicules equally abundant throughout the tissue, together with a minute equianchorate about 3-6000ths in. long (fig. 3, g), and a paraboliform spicule like a bihamate about the same length (fig. 3, d); but not being satisfied that these are independent forms, as they may be ill-developed ones of No. 4, I have not included them in the spiculation. Size of specimen,  $6\frac{1}{2} \times 5 \times 3$  in.

*Hab.* Marine.

*Loc.* Port Elliot, South Australia.

*Obs.* This specimen, which is among the dry sponges purchased by the Trustees of the British Museum from the Executors of the late Dr. Bowerbank, must, when fresh, have probably been 12 in. in diameter, as in desiccation a fresh sponge shrinks to about half its natural size. From its rolled or rounded form it was evidently a beach-specimen, and coming from Port Elliot, was obtained from the same coast, and not very far from that last mentioned. In appearance and structure it very much resembles our *Halichondria incrustans*. Of course the forcipiform flesh-spicule is the most characteristic feature, but instead of being very large, like that of *F. colonensis*, it is very minute, fine, and delicate, while it is in such abundance and lying so close together, that it looks as if it had been developed in groups in a cell, after the manner of a tricurvate, and might be easily mistaken for "trichites." So delicate and fine are the shaft and its spination, that it is with difficulty seen under a power of 250 diameters. On the other

hand, the characteristic anchorate is so short and robust that it forms by far the most prominent object among the flesh-spicules. There is also, as above stated, a small equianchorate and a paraboliform spicule like a bihamate; but as it is possible that these may in some way be related to the robust equianchorate, I have here also not included them among the spiculation, although the representations to which I have alluded are given, but these are for the use of future observers. The arms of the large equianchorate, too, are stated conjecturally to be "petaloid," because their transparency and their refraction of the light as it passes through them renders their real forms so indistinct.

*Halichondria scabida*, n. sp. (Pl. IV. fig. 4, *a-p*, and 5, *a-g*.)

Specimen globular, compressed, sessile (fig. 4, *a*). Consistence tough, fibrous. Colour now brown externally, yellowish internally. Surface even, undulating, consisting of a dense, smooth dermis, more or less covered with suboval and subcircular areas like small scars, separate, or together in juxtaposition (fig. 4, *b b*); area circumscribed by a slightly raised rim, subtended by a delicate cribriform layer of the dermal sarcode, varying in size under  $\frac{1}{4}$  in. in diameter (fig. 4, *k, l, m*). Pores confined to and synonymous with the holes of the cribriform areas, each pore about 1-300 in. in diameter (fig. 4, *k, m*). Vents here and there. Internally, subdermal cavities strongly developed, consisting of a cancellated fibrous structure, in which the folds occupied by spiculous fibre, arching over and intersecting each other, support the pore-areas above (fig. 5, *a b*), which thus open into the excretory canals below (fig. 5, *c*), through which the arching or circular folds (fig. 5, *d*) are continued to the vents in the opposite direction (fig. 5, *g*). Parenchyma fibro-pulpy, of a yellow colour, traversed plentifully by the branches of the excretory canal-systems. Spicules of five forms, viz.:—1, skeletal, acuate, slightly curved, head oval elongated, with contracted neck, passing into a fusiform shaft, which terminates gradually in a sharp point, 51 by 1-6000th in. in its greatest dimensions, head a little less in diameter than the shaft (fig. 4, *d*); 2, subskeletal, simply acuate, curved, gradually sharp-pointed, spined throughout, especially about the obtuse end, 43 by  $1\frac{1}{2}$ -6000ths in. (fig. 4, *e*); 3, the same, but much smaller, viz. 20 by  $1\frac{1}{2}$ -6000ths in. (fig. 4, *f*); 4, flesh-spicule equianchorate, with slightly angulated, curved fusiform shaft, and three diverging knife-shaped arms or flukes at each end, 7-6000ths in. long (fig. 4, *g, i*); 4, ?-small size of same (fig. 4, *h*). No. 5 abounds

throughout the tissue generally, but especially in the dermis; No. 1 in the fibre of the subdermal cavities, and, with Nos. 2 and 3, throughout the spiculo-fibre of the parenchyma. Size of specimen about  $1\frac{4}{12}$  in. high and  $1\frac{8}{12} \times 1\frac{9}{12}$  horizontally in its greatest dimensions.

*Hab.* Marine.

*Loc.* Port Phillip Heads, S. Australia. Depth &c. not given.

*Obs.* This is an extremely interesting specimen, because the pore-areas are circumscribed, and open, through the subdermal cavities, *directly* into the large excretory canals, which present the circular folds to which I have alluded throughout their course, so that by these folds they can be unmistakably traced from the pore-areas to the vents, that is, from one end to the other (fig. 5). In this respect too they correspond with *Grayella cyathophora* ('Annals,' 1869, vol. iv. p. 192, pl. vii. fig. 5); the spiculation, however, is more like that of *Halichondria pustulosa* ('Annals,' 1882, vol. ix. p. 285, pl. xi. fig. 1 &c.), which is a branched sponge with similarly circumscribed pore-areas, from the South Atlantic Ocean about the Falkland Islands; while there is a large dried specimen of *Grayella cyathophora* in the British Museum (No. 15, registered 71.6.5.1) which came from the neighbourhood of the Cape of Good Hope. Dr. Bowerbank's term "angulated" is applied to an equianchorate whose shaft has apparently a triple curve, viz. a large one in the centre and a small one at each end.

*Suberites Wilsoni*, n. sp.

Massive, pyramidal, tending towards compression. Consistence hard, solid, heavy. Colour bright carmine-red. Surface more or less unevenly reticulated, with irregular, depressed intervals, or generally nodulated; or covered with oculiform areas in juxtaposition, like *Rhaphyrus Griffithsii*, Bk. Pores in the interstices of the dermal reticulation, or confined to the pupillary aperture of the oculiform areas. Vents scattered over the surface generally. Internally composed of cancellated sarcodæ, half filled with fine and coarse sand-grains together with other foreign microscopic objects, which make the specimen so heavy; traversed by the branches of the excretory canal-system, terminating at the vents mentioned. Spicule of one form only, viz. pin-like, consisting of a smooth, curved, simple acute, more or less globularly or elliptically inflated, near to, but at a variable distance from, the large end, sometimes so slightly as to reduce the form to a simple acute; diminishing gradually towards the thin end, which is not only obtusely

pointed, but often absolutely round or blunt, 75 by  $1\frac{1}{2}$ -6000ths in its greatest dimensions; disposed plentifully throughout the sarcode, more massively than fibrously. Size of largest specimen, of which there are several both wet and dry, 15 in. high by  $10 \times 5$  in. at the base.

*Hab.* Marine.

*Loc.* Port Phillip Heads, S. Australia. Depth 19 fath.

*Obs.* This is the species to which I have alluded in the 'Annals' for 1882 (vol. xi. p. 350) as being "without flesh-spicule," thus differing, among other things, from the specimen of *Aleyonium purpureum*, Lam., in the British Museum, which bears the nos. "42" and "29." Like *A. purpureum*, it retains its beautiful carmine colour after drying, and this is so abundant that, although it parts with sufficient to tinge other sponges which may be in contact with it when preserved in spirit, this in no degree appears to affect its brilliancy on desiccation. I have named it after Mr. J. Bracebridge Wilson, who obtained it from the place mentioned, and sent it to me with the other specimens to which I have above alluded, requesting at the same time that, if any new species were found among them, types of the same might be deposited in the British Museum, where the "largest specimen," whose measurements are above given, together with two others, may be found, bearing the Register nos. "84. 10. 10. 3-5." The habit of enclosing foreign microscopic objects is so common with the Suberites that it is almost a character.

*Acanthella cactiformis*, n. sp. (Pl. IV. fig. 6, a, b.)

Specimen dry. Erect, flat-branched, stipitate, thorny, cactus-like; stem and branches much compressed, interuniting as they divide, so as to leave large, fenestral intervals. Consistence firm, chiefly from the thick, gluey character of the sarcode when dry, together with the density of the stems. Colour when fresh "dull red," now grey in the spirit-preserved specimen (for there are two), horny brown in the dry one. Surface of the larger branches covered with thorny processes, which, by branching, grow into proliferous portions like miniature specimens of the whole mass, but whose fenestral intervals between the interuniting branches are tympanized by the thick, dermal sarcode, which also webs together the thorn-like bundles of spicules on the surface. Neither pores nor vents seen, probably on account of their having become closed by the contraction of the thick, dermal sarcode during desiccation. Internally, structure hard and compact in proportion to its distance from the surface; consisting, under the thick, glutinous, brown dermis, of a dense accumulation of



spicules held together by a minimum of sarcode, contrasting strongly, by its whiteness, with the brown translucent colour of the superincumbent dermis, and constituting the chief supporting element of the branches. Spicules of two forms, both skeletal, no flesh-spicules, viz. :—1, acuate, simple, smooth, curved, abruptly sharp-pointed,  $75$  by  $2$ - $6000$ ths in. in its greatest dimensions (fig. 6, *a*); 2, acerate, smooth, curved, rather flexuous, gradually sharp-pointed, a little longer than No. 1 (fig. 6, *b*); apparently modifications of each other, as specimens of all sizes and transitional forms may be found among them; equally and plentifully distributed throughout the dermis; forming in bundles the axes of the thorn-like projections, and constituting, as before stated, the chief indurating element of the stem and branches. Size of specimen 16 in. high by  $16 \times 2\frac{1}{2}$  in. horizontally.

*Hab.* Marine.

*Loc.* Port Phillip Heads, S. Australia. Depth 19 fath.

*Obs.* This genus was established by Schmidt in 1862 for two species found in the Adriatic ('Die Spong. d. Adriatisch. Meeres,' p. 64, Taf. vi. fig. 7 &c.), in which the acuate is long and very flexuous or undulatory, while that of the Australian species is comparatively short and simply curved; otherwise there is not much difference between the two species, so little indeed that I am in doubt whether the above-described ought not to be termed a "variety." The specimen has been deposited in the British Museum, where it bears the Register no. "84. 10. 10. 2."

Compactness and hardness of the stem are peculiarly characteristic of my order ECHINONEMATA, arising from condensation of the spicular element of the sponge in these parts.

*Chalina polychotoma*, var. *trichotoma*, n. v.

Specimen dry. Solid, caulescent, digitations long, round and dichotomously branching at first, then ending in expanded, compressed extremities, more or less trichotomously divided, all arising from a single, short, round stem. Consistence resilient. Colour now light sponge. Surface uniformly even, covered with dermal sarcode, corresponding in its reticulation with the subjacent fibres on which it rests. Pores in the interstices of the reticulation. Vents in line along the branches, or scattered over one side especially of the expanded extremities. Internally, structure open, fibro-reticulated, smaller, firmer, and more compact on the surface. Spicule of one form only, viz. acerate, curved, smooth, fusiform, sharp-pointed, *very* minute and thin, about  $8$ - $6000$ ths in. in length, chiefly confined to a line running through the centre of the

fibre; the same form in the sarcode external to the fibre, but a little larger. Besides the latter, the sarcode is plentifully charged with small, nucleated, granuliferous, spherical cells, about 3-6000ths in. in diameter, like ovules. Size of specimen, 19 in. long, consisting of about 50 caulescent digitations, forming a bundle about 12 in. in diameter.

*Hab.* Marine.

*Loc.* Port Phillip Heads, S. Australia. Depth 19 fath.

*Obs.* The typical form of all the caulescent Chalinas which belong to my group "Digitata" ('Annals,' 1875, Classification) is Esper's *Spongia polychotoma* = *S. oculata*, Lam., = *Chalina oculata*, Bk., which latter is the British species, and perhaps the feeblest representative of a form which seems to me to abound all over the world, often in far larger specimens than those of this country, but with very little difference in form, and always with the same kind of acerate spicule. In the present instance the latter is remarkably small, while the keratose element of the fibre is proportionally greater, which, together with the trifid extremities of the branches, characterizes the variety. On the coast of Arabia, when fresh, this species is of a reddish-purple colour; remains of which I have often noticed in the dried specimens at the British Museum, but I have not noticed it in any of Mr. Wilson's spirit-preserved specimens, of which there are several, although, when fresh, some of these also appear from his Catalogue to have been so coloured. I have also often noticed the plentiful presence of the little "nucleated, granuliferous, spherical, cell-like ova" in this kind of Chalina. The above variety has been deposited in the British Museum, where it bears the Register no. "84. 10. 10. 1."

#### EXPLANATION OF PLATE IV.

N.B.—Figs. 1 *a-d*, 2 *a-e*, 3 *a-g*, and 4 *a-h* are drawn to the scale of 1-24th to 1-6000th inch, fig. 6 to the scale of 1-48th to 1-6000th inch, and fig. 7 to 1-48th to 1-1800th inch. The rest are more or less enlarged, and more or less diagrammatic, views of particular parts.

*Fig. 1.* *Esperia parasitica*, spiculation of. *a*, skeletal spicule; *b*, inequianchorate; *c*, bihamate; *d*, minute inequianchorate; *e*, "rosette," showing the way in which the inequianchorates are developed *en groupe*; *f, g, h*, free ends of inequianchorates, more magnified, to show the four teeth.

*Fig. 2.* *Forcepia colonensis*, spiculation of. *a*, skeletal spicule; *b*, forcipiform flesh-spicule; *c*, minute equianchorate; *d*, minute tricurvate; *e*, minute bihamate.

*Fig. 3.* *Forcepia crassanchorata*, spiculation of. *a*, skeletal spicule, acute, subpin-like; *b*, skeletal, globularly inflated at each end; *c*, forcipiform flesh-spicule; *e*, front view of the stout equianchorate; *f*, lateral view of the same; *g*, minute equianchorate; *d*, bihamate-like spicule.

Fig. 4. *Halichondria scabida*, outline of the specimen and its spiculation &c. *a*, outline of the specimen; *b b*, pore-areas; *c*, part of the dermis without pore-areas; *d*, skeletal spicule; *e*, subskeletal spicule; *f*, still smaller form; *g*, large form of equianchorate; *h*, small form of the same; *i*, more magnified view of large form, to show the teeth, arms, or flukes, as they have been called, of the extremities; *k*, pore-areas magnified four diameters; *l*, rim; *m*, pores; *n*, still more magnified view of the pores in a fragment of the sarcode charged with the small form of anchorate (*h*); *o*, pores; *p*, sarcode charged with the anchorate.

Fig. 5. The same. Diagram to show the *direct* connexion of the pore-areas with the excretory canal. *a*, pore-areas; *b*, subdermal cavities or structure; *c*, excretory canal; *d*, circular folds, more or less extending round the surface of the excretory canal; *e*, apertures of the smaller branches in this canal; *f*, filament introduced to show the *direct* communication of the pore-areas with the excretory canal; *g*, vent, with arrow showing the direction of the current.

Fig. 6. *Acanthella cactiformis*, spiculation of. *a*, acute form; *b*, acerate form.

Fig. 7. See explanation in connexion with the paper which it illustrates, p. 122.

## XI.—Mode of Circulation in the Spongida.

By H. J. CARTER, F.R.S. &c.

[Plate IV. figs. 5, *a-g*, and 7, *a-p*.]

IN the month of July 1857, when my observations "On the Ultimate Structure of *Spongilla*" were published ("Annals," vol. xx. p. 21, pl. i.), I thought there could be no doubt about the course of the circulation in the Spongida, as the minute portion of *Spongilla* developed from the statoblast (gemmule or seed-like body) is so small and yet so perfect that it can be easily kept under the microscope, while the red particles of carmine-paint that may be brought into contact with it are taken in and discharged before the eye. By being "so perfect," I mean that it consists of only one "person" (Häckel), that is, it is a minute epitome of sponge-structure in which there is only one vent and therefore only one excretory canal-system; hence a view of the whole portion which is translucent can be easily commanded by the aid of a microscopic power of 250–300 diameters (in water of course).

Under such circumstances (I must here revert to my original nomenclature and diagram, *op. et loc. cit.* pl. i. fig. 1) the particles of carmine-paint may be seen to pass through the holes of the "investing membrane" (pore-dermis) into the so-called "cavity" of this membrane (subdermal cavities), and